Philosophical Transactions

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and therefore I think we have ſufficient Reaſon to conclude that their Meaſures were certainly taken very near the Truth.

John Ellicott.

XII. *Several* Papers *concerning a new* Semi-Metal, *called* Platina; *communicated to the* Royal Society *by Mr.* Wm. Watſon *F. R. S.*

I.

Extract of a Letter from William Brownrigg *M. D. F. R. S. to* Wm. Watſon *F. R. S.*

Dear Sir, *Whitehaven, Dec.* 5, 1750.

Read Dec. 13. 1750.

I TAKE the Freedom to incloſe to you an Account of a Semi-metal call'd *Platina di Pinto*; which, ſo far as I know, hath not been taken notice of by any Writer on Minerals. Mr. *Hill*, who is one of the moſt modern, makes no mention of it. Preſuming therefore that the Subject is new, I requeſt the Favour of you to lay this Account before the *Royal Society*, to be by them read and publiſhed, if they think it deſerving thoſe Honours. I ſhould ſooner have publiſhed this Account, but waited, in hopes of finding Leiſure to make further Experiments on this Body with ſulphureous and other Cements; alſo with Mercury, and ſeveral corroſive *Menſtrua*. But theſe Experiments I ſhall now defer, until I learn how the above is receiv'd. The Experiments which I have related were ſeveral of them made by a Friend, whoſe Exactneſs in performing them, and Veracity in relating them, I can rely on: However, for greater Certainty, I ſhall myſelf repeat them I am, dear Sir,

Your moſt obedient Servant,

W. Brownrigg.

II.

Memoirs of a Semi-metal called Platina di Pinto, *found in the* Spaniſh Weſt Indies.

ALTHO' the Hiſtory of Minerals, and other foſſil Subſtances, hath been diligently cultivated, eſpecially by the Moderns; yet it muſt be acknowleged, that, among the vaſt Variety of Bodies which are the Objects of that Science, there ſtill remains Room for new Inquiries.

No Wonder that, among the great, and almoſt inexhauſtible Varieties of Salts, Ores, and other Concretes, new Appearances, and Mixtures before unknown, ſhould daily be diſcover'd: But that, among Bodies of a more ſimple Nature, and particularly among the metalline Tribe, ſeveral diſtinct Species ſhould ſtill remain almoſt wholly unknown to Naturaliſts, will doubtleſs appear more ſtrange and extraordinary.

Gold is uſually eſteem'd the moſt ponderous of Bodies; and yet I have ſeen, in the Poſſeſſion of the late Profeſſor *s'Graveſande*, a metalline Subſtance, brought from the *Eaſt Indies*, that was ſpecifically heavier than Gold, by at leaſt a twentieth Part. Mercury, next to Gold, is commonly ſaid to be the heavieſt Body; yet Mercury is greatly exceeded in ſpecific Gravity by a Semi-metal brought from the *Weſt Indies*, whereof I have now the Honour to preſent Specimens to the *Royal Society*. And this Semi-metal ſeems more particularly to deſerve our Attention, as it is endu'd with ſome very ſingular Qualities, which plainly demonſtrate that certain general Theorems, tho' long eſtabliſh'd, and univerſally receiv'd by the Metallurgiſts, yet do not hold true in all Caſes, and ought not to be admitted into their Arts, without proper Limitations and Reſtrictions. For inſtance, *That Gold and Silver may be purified from all heterogeneous Subſtances by Coppellation*, is a Propoſition that all Aſſayers and Refiners have long thought true and undeniable; yet this Propoſition ought not to be receiv'd by thoſe Artificers, without an Exception to the Semi-metal here treated of; ſince, like thoſe nobler Metals, it reſiſts the Power of Fire, and the deſtructive Force of Lead in that Operation.

This Semi-metal was firſt preſented to me about nine Years ago, by Mr. *Charles Wood*, a ſkilful and inquiſitive Metallurgiſt, who met with it in *Jamaica*, whither it had been brought from *Carthagena* in *New Spain*. And the ſame Gentleman hath ſince gratified my Curioſity, by making further Inquiries concerning this Body. It is found in conſiderable Quantities in the *Spaniſh Weſt Indies* (in what Part I could not learn) and is there known by the Name of *Platina di Pinto* The *Spaniards* probably call it *Platina*, from the Reſemblance in Colour that it bears to Silver. It is bright and ſhining, and of a uniform Texture; it takes a fine Poliſh, and is not ſubject to tarniſh or ruſt; it is extremely hard and compact; but, like Bath-metal, or caſt Iron, brittle, and cannot be extended under the Hammer.

The *Spaniards* do not dig it in the Form of Ore, but find it in Duſt, or ſmall Grains, as herewith preſented to the *Royal Society*. Whether they gather it in a pretty pure State, as brought to us, or waſh it, like Gold-duſt, from among Sand, and other lighter Subſtances, is to me unknown: However, it is ſeldom collected perfectly pure; ſince, among ſeveral Parcels of it that I have ſeen, I conſtantly obſerv'd a large Mixture of a ſhining black Sand, ſuch as is found on the Shores of *Virginia* and *Jamaica*, which is a rich iron Ore, and anſwers to the Magnet. It hath alſo uſually mix'd with it ſome few ſhining Particles of a golden Colour, which ſeem to be a Subſtance of a different Nature.

It is very probable that there is great Plenty of this Semi-metal in the *Spaniſh Weſt Indies*; ſince Trinkets made of it are there very common. A Gentleman of *Jamaica* bought five Pounds of it at *Carthagena* for leſs than its Weight of Silver; and it was formerly ſold for a much lower Price.

When expoſed by itſelf to the Fire, either in Grains, or in larger Pieces, it is of extreme difficult Fuſion; and hath been kept for two Hours in an Air-Furnace, in a Heat that would run down caſt Iron in fifteen Minutes: Which great Heat it endur'd without being melted or waſted; neither could it be brought to fuſe in this Heat, by adding to it Borax, and other ſaline Fluxes. But the *Spaniards* have a Way of melting it down, either alone, or by means of ſome Flux; and caſt it into Sword-hilts, Buckles, Snuff-boxes, and other Utenſils.

When expoſed to a proper Degree of Fire, with Lead, Silver, Gold, Copper, or Tin, it readily melts and incorporates with theſe Metals; rendering the Mixture, like itſelf, extremely hard and brittle.

Having been melted in an Aſſay-Furnace, on a Teſt with Lead, and therewith expoſed to a great Fire for three Hours, till all the Lead was wrought off, the *Platina* was afterwards found remaining at the Bottom of the Teſt, without having ſuffer'd any Alteration or Diminution by this Operation.

A Piece of *Platina* was put into ſtrong and pure *Aqua fortis*, and therewith placed in a Sand-heat for twelve Hours: The *Platina*, when taken out of the *Aqua fortis*, was found of the ſame Weight as when put into it; being in no-wiſe diſſolved or corroded by that *Menſtruum.*

It had been reported, that this Semi-metal was ſpecifically heavier than Gold; but having weigh'd ſeveral Pieces of it hydroſtatically in a nice Aſſay-Balance, I found one of theſe Pieces to weigh in Air *gr.* $\frac{345}{8}$, and in Water *gr.* $\frac{322}{8}$: So that its ſpecific Gravity was to that of Water exactly as 15 : 1. Another Piece, that ſeem'd to be caſt very open and porous, I found in Gravity to Water only as 13.91 to 1. Altho' this laſt-mention'd Piece, could it have endur'd the Hammer as well as Gold, might probably have been reduc'd to a conſiderably greater Degree of Solidity than that of the firſt-mention'd Specimen. For the pureſt Gold is ſeldom found, after Fuſion, to come up to its true ſpecific Weight, until it hath been brought up to its greateſt Degree of Solidity under the Hammer.

I alſo weigh'd an equal Mixture of Gold and *Platina*, which I found nearly as ponderous as Gold itſelf; the ſpecific Weight of this Mixture being to that of Water as 19 to 1.

It hath been reported, that the *Spaniards* have ſometimes been tempted to adulterate Gold with *Platina*, as the Mixture could not be diſtinguiſh'd from true Gold by all the ordinary Trials: But the Gold thus adulterated was, upon a nicer Examination, found hard and brittle, and could not be ſeparated from the *Platina*, and render'd ductile and pure, either by Cementation, or by the more ordinary Operations with Lead and Antimony. In order therefore to prevent this Fraud, the King of *Spain* commanded that the Mines of *Platina* ſhould be ſtopped up; ſo that this Semi-metal is now much ſcarcer than formerly.

From the foregoing Account it appears, that no known Body approaches nearer to the Nature of Gold, in its moſt eſſential Properties of Fixedneſs and Solidity, than the Semi-metal here treated of; and that it alſo bears a great Reſemblance to Gold in other Particulars. Some Alchemiſts have thought that Gold differ'd from other Metals in nothing ſo much as in its ſpecific Gravity; and that, if they could obtain a Body that had the ſpecific Weight of Gold, they could eaſily give it all the other Qualities of that Metal. Let them try their Art on this Body; which, if it can be made as ductile as Gold, will not eaſily be diſtinguiſh'd from Gold itſelf.

Upon the whole, this Semi-metal ſeems a very ſingular Body, that merits an exacter Inquiry into its Nature than hath hitherto been made; ſince it is not altogether improbable, that, like the Magnet, Iron, Antimony, Mercury, and other metallic Subſtances, it may be endowed with ſome peculiar Qualities;

lities, that may render it of ſingular Uſe and Importance to Mankind.

Specimens of Platina *preſented to the* Royal Society.

N°. 1. *Platina*, in Duſt, or minute Maſſes, mixed with black Sand, and other Impurities, as brought from the *Spaniſh Weſt Indies*.
2. Native *Platina*, ſeparated from the above-mention'd Impurities.
3. *Platina* that has been fuſed.
4. Another Piece of *Platina*, that was Part of the Pummel of a Sword.

III.

To the Royal Society.

Gentlemen, *London*, *Dec.* 13, 1750.

I BEG Leave to ſubjoin a few Lines to my learned and ingenious Friend Dr. *Brownrigg*'s Paper concerning the *Platina di Pinto*, or what is likewiſe call'd in *America Juan Blanco*. This Subſtance is mention'd in no Author I have met with, except by our worthy Brother Don *Antonio d'Ulloa*, who, in the Hiſtory of his Voyage to *South America*, *Vol.* II. *Book* 6. *Chap.* 10. which I have here extracted, and tranſlated from the *Spaniſh*, when giving an Account of the Gold and Silver Mines in the Province of *Quito*, and of the various Methods of ſeparating theſe Metals from other Subſtances, with which they are combin'd, ſays, that, " in the Territory of " *Choco* .... there are Gold Mines, in which that

“ Metal is ſo diſguiſed and enveloped with other
“ mineral Subſtances, Juices, and Stones, that, for
“ their Separation from the Gold, they are obliged
“ to uſe Quickſilver. Sometimes they find mineral
“ Subſtances, which, from their being mixed with
“ *Platina*, they chuſe to neglect. This *Platina*
“ is a Stone (*Piedra*) of ſuch Reſiſtance, that it
“ is not eaſily broken by a Blow upon an Anvil.
“ It is not ſubdued by Calcination; and it is very
“ difficult to extract the Metal it contains even with
“ much Labour and Expence.”

In the before-mention'd Work, *Chap.* 11. the ſame
Author, when ſpeaking of the remaining Works of
the *Indians* of old, ſays, “ the *Specula* wrought
“ out of Stones, which are found in the Places of
“ Worſhip of the *Indians*, are of two kinds, in relation
“ to the Matter of which they are made:
“ One of theſe is call'd *Piedra de Inga*, the other
“ *Piedra de Gallinazo*. The firſt of theſe is ſmooth,
“ of a leaden Colour, and not tranſparent; they are
“ uſually found wrought of a circular Figure: One
“ of the Surfaces is plain, and as ſmooth as though
“ it were made of a kind of Chryſtal; the other Surface
“ is oval, or rather ſomewhat ſpherical, and not
“ ſo much burniſh'd as the plain one. Although they
“ vary in their Size, they are commonly from three
“ to four Inches in Diameter; but he has ſeen one
“ that was a Foot and half in Diameter. Its principal
“ Surface was concave, and much augmented
“ the Size of Objects, as its Poliſh was in as great
“ Perfection as though it had been work'd by a dextrous
“ Artiſt in theſe Times.

"This Stone has certain Veins, or hair-like Ap-
"pearances, on its Surface; whereby it is render'd
"leſs fit for a *Speculum*, and is apt to break in
"theſe Veins in receiving any Blow. Many are
"perſuaded, or at leaſt ſuſpect, that the Matter of
"theſe is a caſt Compoſition; and although there are
"ſome Appearances of this being ſo, they are not ſuffi-
"ciently convincing. In this Country there are Gul-
"lies (*Quebradas*) where the Mineral of them is found
"rough, and from whence ſome are always taken;
"but theſe are not now wrought for thoſe Purpoſes
"for which heretofore they were employ'd by the
"*Indians:* But this is no Reaſon but that ſome
"of them may have been caſt, as with the ſame
"Material taken out of the Mine, they may have
"been made artificially, and thereby have receiv'd a
"greater Degree of Perfection, as well in their Qua-
"lity as in their Figure." He ſays further, "that,
"although at preſent, theſe, as well as ſeveral other
"things found there are but of ſmall Value, never-
"theleſs they are extremely curious, and worthy
"to be eſteem'd, as well for their great Antiquity,
"as for their being the Performances of thoſe bar-
"barous People."

Some of theſe *Piedras de Inga* I now take the Liberty of laying before the *Society*, both in their rough and in their poliſh'd State. They were brought hither with ſeveral other Curioſities from *America*, by that excellent Perſon, and my much-lamented Friend, Don *Pedro Maldonado*, and were preſented by him to our moſt worthy *Preſident*, who was pleaſed to put them into my Hands. They are doubtleſs of a metalline Subſtance, and have, in my Opinion, evident Marks of having been fuſed and caſt. They very much reſemble, as you will ſee by comparing them, the *Platina* before-mention'd: And though they are call'd (*Piedras*) Stones by Don *Antonio d'Ulloa*, he likewiſe gives the ſame Appellation to the *Platina*. I cannot therefore help recommending to ſome curious Metallurgiſt of the *Society* to make the Experiment, whether or no, when the *Piedras de Inga* are, by a proper Proceſs, diveſted of their ſtony and other heterogeneous Parts, the metalline *Reſiduum* will not reſemble, as well in ſpecific Gravity (for which it is ſo remarkable) as in other Properties, the purified *Platina* now before us?

Wm. Watſon.

IV.

Read Dec. 20. 1750.

IN *January* 1742-3. there were brought from *Jamaica*, in a Man of War, ſeveral Bars (as thought) of Gold, conſigned from different Merchants of that Iſland, to their different Correſpondents here, as Bars of Gold. Theſe Bars had the ſame ſpecific Gravity, or rather more than Gold, and were exactly like that Metal in Colour, Grain, *&c.* A Piece of one of theſe counterfeit Bars was ſent to the Mint to be teſted, and it was found to be twenty-one Carats three Grains worſe than Standard.

Emanuel Mendez da Coſta.

V.

Extract of a Letter from Wm. Brownrigg *M. D. and F. R. S. to* Wm. Watſon *F. R. S. containing ſome further Experiments upon the* Platina.

Whitehaven, Feb. 13, 1750.

Read Feb. 28. 1750-51.

I WAS favour'd with your Letter of *Dec.* 15, and am much obliged to you for the Trouble you took in preſenting my Specimens of the *Platina* to the *Royal Society*, together with my Memoir relating thereto; and I thank you for the Addition you made to it of the Extract of Don *d'Ulloa*'s Voyage.

The Gentleman, whoſe Experiments on *Platina* I mention'd to the *Royal Society*, was Mr. *Charles Wood*, who permitted me to make what Uſe of them I pleaſed; and I did not pretend to have made any new Diſcovery, nor to know ſo much of that Body, as hath long been known to the *Spaniards*. I might indeed have made uſe of his Authority; but he was not ambitious of appearing in Print.

The chief thing about which I had any Difficulty, was what had been aſſerted of the *Platina*'s reſiſting the Force of Lead in Coppellation. This Experiment I have tried therefore, by adding to *gr. xxvi.* of *Platina*, ſixteen times its Weight of pure Lead, that I had myſelf reduced from Litharge. To the Lead put into a Coppel, and placed in a proper Furnace; as ſoon as it was melted I added the *Platina*, which in a ſhort time was diſſolved in the Lead. After the Lead was all wrought off, there remain'd at the Bottom of the Coppel a Pellet of *Platina*, which I found to weigh only *gr. xxi.*; ſo that, in this Operation, the *Platina* had loſt near a fifth Part of its Weight.

According therefore to this Experiment, the *Platina* does not wholly reſiſt the Force of Lead in Coppellation; but, by repeated Operations of that kind with larger Quantities of Lead, may probably all be deſtroy'd: And by ſuch repeated Coppellations, Gold and Silver may very likely be refin'd from it; although what was before aſſerted may hold pretty true, with regard to the common Coppellations of the Aſſayers and Refiners.

Mr. *Wood* ſaid, that, in his Experiment, he thought the *Platina* rather gain'd than loſt in Weight by Coppellation. This might happen from ſome ſmall Mixture of Lead, or other Metal continuing with it after it remained no longer fuſed.

From this ſingle Experiment I will not be quite poſitive that Lead thus conſumes ſome ſmall Quantity of *Platina*, ſince it is poſſible the *Platina* uſed might not be pure. Beſides, in order to keep it longer in Fuſion, I urged on the Experiment with an uncommon Degree of Heat, eſpecially towards the End of the Operation; although I think no great Error could thence ariſe; as half a Drachm of Silver, which I coppell'd at the ſame time, had loſt only two Grains in the Operation.

I am told that one Mr. *Ord*, formerly a Factor to the *South Sea Company*, took in Payment from ſome *Spaniards* Gold, to the Value of 500 *l.* Sterling, which being mix'd with *Platina*, was ſo brittle, that he could not diſpoſe of it, neither could he get it refin'd in *London*, ſo that it was quite uſeleſs to him: Altho', if no Error hath been committed in the above-mention'd Experiments, it might probably have been render'd pure by a much larger Doſe of Lead than is uſually applied for that Purpoſe.

To my Memoir I might have added, that, attempting to cleanſe a Parcel of the native *Platina* from the black Sand, wherewith it was mixed, I found that a great many of its Grains were attracted by the Magnet I made uſe of for that Purpoſe. This Circumſtance I took notice of in a Letter to Lord *Lonſdale* two Years ago. I am,

Dear Sir,

Your moſt obliged humble Servant,

W. Brownrigg.

XIII. *An Account of a very large human* Calculus, *by* Wm. Heberden *M. D. F. R. S. and Fellow of the* Coll. *of* Phyſic. Lond.

Read Dec. 20. 1750.

THERE is preſerved in the Library of *Trinity-College* in *Cambridge*, a Stone taken from a human Bladder, which, for its uncommon Size, may deſerve the Notice of his *Society*. It is of an oval Shape, flatted on one Side and its Surface is ſmooth. The ſpecific Gravity plainly ſhews, that it is of an animal Origin; for its Weight is to that of Water only as 1,75 to 1.

In order to get a true and well-atteſted Hiſtory of this curious Stone, the Right Rev. Dr. *Claggett*, late Biſhop of *Exeter*, was applied to, who was Keeper